REMARKS

Upon entry of this amendment, claims 1, 3-24,26-28, 30-32, 34-36 and 38-40 will be pending in the application, of which claims 1, 4, 12, 13, 14, 18, 21, 22, 24, 28 and 36 are being amended.

Independent claims 1, 24, 28 and 36 are amended to specify that the target having pre-sputtered surface is a "deposition target". Claims 4, 12, 18, 21 and 22, which depend from claim 1, are amended to recite "deposition target", which is consistent with claim 1. Claim 12 is also being amended to remove redundant language. Claims 13 and 14 are being amended to recite "metal layer", which is consistent claim 12. These amendments are supported at least by claims 1, 24, 28 and 36 as filed.

Claim 1 is also being amended to reintroduce the language "thereby forming a coating comprising the metal in the sputtered depression", which is needed as claim 5 and others refer to the "coating".

The claim amendments add no new matter, and were previously in the claims, thus, entry of the amendments is respectfully requested.

Claim Rejections

I. Claims 1, 3-7, 12-14, 18-20, 24, 26-28, 30-32, 34-36, and 38-40 were rejected under 35 U.S.C. § 102(b) as anticipated by Vukanovic et al (U.S. Patent No. 4,505,947).

In order to anticipate a reference, each and every element of the claim must be disclosed by a single prior art reference. W. L. Gore & Assocs. v. Garlock, Inc., (Fed Cir. 1983), cert. denied, 469 U.S. 851 (1984).

Claim 1 recites a method of refurbishing a deposition target having a pre-sputtered surface with a sputtered depression, the method comprising providing the pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone; generating an electrical arc in the process zone; inserting a consumable metal wire into the process zone to form liquefied metal; and injecting a pressurized gas into the process zone to direct the liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal, thereby forming a coating comprising the metal in the sputtered depression.

In order to anticipate claim 1, Vukanovic et al. has to teach each and every step of the method of claim 1. However, Vukanovic et al. does not teach the claimed step of providing a pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone. A deposition target is one that is used in a sputtering process. Providing a pre-sputtered surface of a deposition target means providing a surface of a target that has already been sputtered, and which has a sputtered depression that resulted from such a pre-sputtering step. Vukanovik et al. does not teach this step of providing a particular type of deposition target, and instead teaches the step of providing an entirely different substrate, namely:

> "Substrates which may be coated include conductive or non-conductive substrates for semiconductor applications, and glass microballoons utilized as nuclear fuel targets for inertial confinement fusion processes."

(Vukanovic et al., Column 1, lines 14-18) Vukanovic et al. further teaches that:

> "Coated substrates may be produced which include semiconductors, photovoltaic thin films, fusion target pellets or coated microballoons, high tolerance bearings and protective coatings such as passivation layers (SiN2). Accordingly, substrates to be utilized may include glass microballoons, quartz, glass, or conductive metals such as aluminum, stainless steel, and the like."

(Vukanovic et al., Column 4, lines 37-43) The substrates taught by Vukanovic et al. are semiconductor and photovoltaic device substrates, and spherical substrates such as fusion target pellets and high tolerance bearings, none of which are deposition targets. Thus Vukanovic et al. does not teach providing a pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone, as claimed in claim 1. For the same reasons, Vukanovic et al. does not anticipate independent claims 24, 28, 32 and 36, which contain similar language.

With respect to claim 1, Vukanovik et al. also does not teach the step of injecting a pressurized gas into the process zone to direct a liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal, thereby forming a coating comprising the metal in the sputtered depression, as claimed in claim 1. Vukanovic et al. does not teach providing a deposition target comprising a sputtered depression to a process zone and instead teaches providing other types of substrates. Vukanovic et al. also does not teach injecting a pressurized gas into the process zone to direct the liquefied metal into the sputtered depression of the deposition target. Thus, Vukanovic et al. does not teach all of the elements of claim 1 and therefore does not anticipate claim 1.

For these reasons, the 102(b) rejection of claims 1, 3-7, 12-14, 18-20, 24, 26-28, 30-32, 34-36 and 38-40, should be withdrawn.

Claim Rejections under 35 USC § 103(a)

II. Claims 1, 3-7, 12-14, 18-20, 24, 26-28, 30-32, 34-36, and 38-40 were also rejected, in the alternative, under 35 U.S.C. § 103(a) as obvious over Vukanovic et al.

Claim 1 is not obvious over Vukanovic et al. An obviousness rejection requires that the prior art references, when combined, teach or suggest the invention as a whole. Prior art references that are combined must teach or suggest all the claim limitations. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). In making the assessment of differences between the prior art and the claimed subject matter, section 103 specifically requires consideration of the claimed invention "as a whole." Princeton Biochemicals, Inc. v. Beckman Coulter, Inc. (Fed. Cir., No. 04-1493, 6/9/05).

Vukanovic et al. does not render obvious claim 1 because Vukanovic et al. does not teach or suggest a method of refurbishing a deposition target having a pre-sputtered surface with a sputtered depression, by at least partially filling the sputtered depression with a liquefied metal that forms a coating in the sputtered depression, as claimed in claim 1. Instead, Vukanovic et al. teaches coating conductive or non-conductive substrates for semiconductor applications, and glass microballoons utilized as nuclear fuel targets for inertial confinement fusion processes. It is not obvious to one of ordinary skill in the art to derive a process for at least partially filling a sputtered depression in a pre-sputtered surface of a deposition target based upon teachings to a process for coating substrates for semiconductor applications or glass microballoons as taught by Vukanovic et al. Coating substrates is not the same as partially filling a sputtered depression. Nor would one of ordinary skill think of refurbishing a deposition target by at least partially filling sputtered depressions based on teachings to providing coatings for various, and entirely different, structures.

Further, Vukanovic et al. does not teach or suggest specific steps that are recited in each of the pending claims. For example, Vukanovic et al. does not teach the claimed step of providing a pre-sputtered surface of the deposition target comprising a sputtered depression, in a process zone, as claimed in any of claims 1, 24, 28, 32 and 36. A deposition target has a specific structure for use as a source in a sputtering process. Providing a pre-sputtered surface of a deposition target means providing a surface of a target that has already been sputtered. Further, the step also recites providing a deposition target which has a sputtered depression. Vukanovik et al. does not teach or suggest such a step, and instead teaches providing a different substrate which is not the same as providing a deposition target. Thus Vukanovic et al. does not teach providing a pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone, as claimed in any of claims 1, 24, 28, 32 and 36.

Vukanovic et al. also does not teach providing the deposition target comprising a sputtered depression to a process zone and directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal, as claimed in claims 1, 24, 28, 32 and 36. Instead, Vukanovic et al. teaches applying a coating to form semiconductors, photovoltaic thin films, fusion target pellets or coated microballoons, as explained above. Vukanovic et al.'s teachings towards coating of semiconductor substrates and fusion target pellets should not be construed in hindsight to suggest a process for, or the desirability of, refurbishing a deposition target.

Further, Vukanovic et al. does not motivate derivation of the present claims because Vukanovic et al. does not teach or suggest the advantages and benefits provided by the present process. The claimed process provides an efficient and cost-effective method of refurbishing a pre-sputtered surface or a deposition target with metal. It also allows flexibility in terms of

materials for filling various shapes and sizes of sputtered depressions of the previously sputtered surfaces commonly occurring in the refurbishment of targets. Further, the claimed process provides low contamination levels of target material because the metals are liquefied and deposited right before entering the depressions of the sputtering target. These benefits and advantages of the claimed process are not taught or suggested by the coating substrate process taught by Vukanovic et al.

Thus Vukanovic et al. does not teach or suggest, and therefore does not render obvious claims 1, 24, 28, 32 and 36, or the claims dependent therefrom, which contain similar language.

For these reasons, the obviousness rejection of dependent claims 3-7, 12-14, 18-20, 24, 26-28, 30-32, 34-36 and 38-40, should also be withdrawn.

III. The Office Action rejected claims 8-9 and 15 under section 103 (a) as unpatentable over Vukanovic et al.

Claims 8-9 and 15 all depend upon claim 1. Claim 1 is not obvious over Vukanovic et al. because Vukanovic et al. does not teach or suggest the step of "providing the pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone". Nor does Vukanovic et al. teach or suggest directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal, as claimed. Thus Vukanovic et al. does not teach claim 1 as a whole.

Further, Vukanovic et al. does not motivate derivation of the present claims because Vukanovic et al. does not teach or suggest the advantages and benefits provided by the present process. The claimed process provides an efficient and cost-effective method of refurbishing a pre-sputtered surface or a deposition target with metal. It also allows a range of materials to be

used to fill the pre-sputtered surfaces. Further, the process reduces contamination levels of the target material because it is liquefied and deposited right into the depressions of the sputtering target. These benefits and advantages of the claimed process are not taught or suggested by Vukanovic et al.

For these reasons, claims 8-9 and 15 are not obvious over Vukanovic et al.

IV. The Office Action rejected claims 10-11 and 16-17 under section 103 (a) as unpatentable over Vukanovic et al., and further in view of Wu et al. (USPG Publication no. 2003/0102207)

Claims 10-11 and 16-17 all depend upon claim 1. Claim 1 is not obvious over Vukanovic et al. and Wu et al. because neither reference teaches or suggest "providing the pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone" as claimed. Vukanovic et al. teaches a substrate 43, which in Example 1 is described as a flat quartz substrate. A quartz substrate is not a target that is sputtered or which has depressions formed by sputtering. Nor does Vukanovic et al. teach or suggest that the quartz substrate has sputtered depressions that should be filled. Vukanovic et al. also does not teach or suggest directing liquefied metal into the sputtered depression of the target to at least partially fill the sputtered depression with the liquefied metal as claimed. Thus Vukanovic et al. does not teach claim 1 as a whole.

Wu et al. does not make up for the deficiencies of Vukanovic et al. because Wu et al. also does not teach or suggest directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal as claimed. Instead Wu et al. teaches a method of producing nano powders (Abstract).

Further, neither Vukanovic et al. nor Wu et al. teach or suggest the advantages and benefits provided by the present process, namely, the ability to fill in depression regions of a deposition target that are sputtered off at higher sputtering rates than other regions in sputtering processes, to extend the life of a deposition target. In many deposition processes, uneven sputtering of the target surface can significantly reduce target life. Moreover, the depressions can have depths or other dimensions that vary across the target surface making it difficult to uniformly fill these depressions. The claimed process fills these depressions on the deposition target in an efficient, controllable, and cost-effective method. It also allows refurbishing of a pre-sputtered surface with metal without excessive contamination. These benefits and advantages of the claimed process are not taught or suggested by Vukanovic et al. or Wu et al..

For these reasons, claims 10-11 and 16-17 are not obvious over Vukanovic et al. and Wu et al.

V. The Office Action further rejected claims 21-23 under section 103 (a) as unpatentable over Vukanovic et al., and further in view of Lee et al. (US patent no. 7,192,235).

Claims 21-23 all depend upon claim 1. Claim 1 is not obvious over Vukanovic et al. and Lee et al. because neither reference teaches or suggests providing a pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone. Vukanovic et al. teaches a substrate 43 which in Example 1 is a flat quartz substrate – which is not a deposition target and is not used for sputtering material. Nor does the Vukanovic et al. teach or suggest that the quartz substrate has sputtered depressions that should be filled. Vukanovic et al. also does not suggest directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered

depression with the liquefied metal to refurbish the target as claimed. Thus Vukanovic et al. does not teach claim 1 as a whole.

Lee et al. does not make up for the deficiencies of Vukanovic et al. because Lee et al. also does not teach or suggest directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal as claimed. Instead Lee et al. teaches a method and apparatus for chemically, mechanically, and/or electrolytically removing material from a microelectronic substrate. (Abstract.) A process for removing material from a microelectronic substrate is not the same as a process for refurbishing a deposition target. Further, Lee et al. describes a process for removing material from the microelectronic substrate rather than filling depressions on the substrate. Clearly, Lee et al. does not teach or suggest directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal as claimed.

Further, neither Vukanovic et al. nor Lee et al. teach or suggest the advantages or desirability of filling depression regions on a deposition target which are formed when the deposition target is sputtered. Nor do the cited references recognize that a sputtered target has regions which are sputtered at higher sputtering rates than other regions, and which when filled with material, can extend the life of a deposition target. Further, the cited references do not recognize the advantages of the claimed process for filling depressions which have depths or other dimensions that vary across the deposition target surface, making it even more difficult to uniformly fill these depressions. The claimed process fills these depressions on the deposition target in an efficient, controllable, and cost-effective method. The process also allows refurbishing a pre-sputtered surface. These benefits and advantages of the claimed process are not taught or suggested by Vukanovic et al. or Lee et al.

For these reasons, claims 21-23 are not obvious over Vukanovic et al. and Lee et al.

CONCLUSION

Should the Examiner have any questions regarding the above remarks, the Examiner is requested to telephone the undersigned representative at: (415) 538-1555.

Respectfully submitted,
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